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SPARTA ENGINEERING'S

Pump Truck

Parts + Service Manual

This is a sample manual and includes the first 22 pages of the official SPARTA Pump Truck Manual. The complete 61-page manual will be available from SPARTA after purchasing a unit.

CBI MANUFACTURING

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HYDRAULIC PUMP PARTS AND SERVICE MANUAL

REVISIONS			
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8.0	Gaby Ulloa	Changes To manual	22.04.14

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PART I: INTRODUCTION AND SPECIFICATIONS

1.1 USE OF THIS MANUAL

This manual contains information for operation, maintenance and troubleshooting. Every effort was made to ensure accurate and complete information but it is not guaranteed. If a situation of doubt or uncertainty arises, please consult the Engineering and/or Service Department at CBI Manufacturing.

1.1.1 REVISIONS AND AMENDMENTS

Manufacturers constantly aim to improve their products and ultimately, their design will change resulting in amendments or revisions of manuals. When this occurs, relevant pages or documents shall be delivered to each manual holder for update by inserting the pages or documents in the correct location and by noting the revision or amendment in the Revisions and Amendment page at the front of this manual.

1.1.2 THIRD PARTY INFORMATION

This manual encloses information of components manufactured or provided by other companies. This information is included to aid identification, operation, maintenance and service of the equipment. CBI Manufacturing does not guarantee the accuracy or completeness of this information. Additional information may be found by contacting the Engineering and/or Service Department at CBI Manufacturing.

1.1.3 MODIFICATION OR REPAIR

Please do not modify or repair this equipment without consultation with the Engineering and/or Service Department at CBI Manufacturing.

1.1.4 SAFETY SUMMARY

This manual uses the following standard safety terms and conventions which span all areas of industry:

WARNING: A Warning is used when an operating procedure, practice, etc., which, if not correctly implemented, could result in personnel injury and/or and equipment damage.

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CAUTION: A Caution is used when an operating procedure, practice, etc., which, if not correctly implemented, could result in equipment damage.

NOTE: A Note provides information necessary to properly complete a procedure or information which will make the procedure easier to understand.

Only qualified personnel should be allowed to operate and maintain the equipment. Personnel should not operate the unit unless they are thoroughly familiar with all unit operating controls, functions, and have read the equipment manual.

Do not attempt equipment operation with inadequate visibility, suitable lighting provisions are available. Operating and maintenance personnel should wear suitable protective clothing and equipment.

Promote good safety measures at all times around the equipment throughout all operating phases. It is the equipment owner's/operator's responsibility to establish good safety measures including personnel training, and enforce safety practices.
Before performing maintenance on or disconnecting any electrical connections, ensuring electrical power is locked out before attempting maintenance.

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1.2 STATEMENT OF WARRANTY

CBI Manufacturing warrants the Equipment to be free from defects in material and workmanship for the period of TWELVE (12) months starting from the Date of Delivery.

CBI Manufacturing also reserves the right to inspect the Equipment to determine the validity of the warranty prior to repairs. If the warranty remains valid, CBI Manufacturing will, at its option: (1) Replace the defective Equipment or part thereof; (2) Authorize the return of the Equipment or part to be repaired at an authorized repair facility; or (3) Authorize the repair of the Equipment or part at your own facility. CBI Manufacturing will not be accountable for transportation costs.

Repair or replacement of the Equipment or parts will be done without charge. Removal and installation of other parts, including additional parts furnished, will be made at the Purchaser's expense. No charges will be accepted on returns, repairs or modifications made by the Purchaser without the written consent of CBI Manufacturing.

It is accepted by the Purchaser that all design specifications for the Equipment have been met or surpassed, and that no other warrantees of any form are in effect other than stated herein. This includes any warranties of fitness for a particular use or merchantability, which CBI Manufacturing hereby disclaims.

The Purchaser is to pay for all charges for travel time, kilometer charges and travel expenses for warranty work performed away from CBI Manufacturing's fabrication facility.

NOT COVERED UNDER THIS WARRANTY:

- Equipment or parts manufactured by others. But CBI Manufacturing, will assign the benefits of any manufacturer's warranty if possible.
- Equipment or parts that have come into contact with corrosive chemicals or materials.
- Equipment or parts customarily subjected to wear.
- Equipment or parts damaged due to improper use or inadequate maintenance.

CBI Manufacturing will not assume Liability or warranty for any death or injury caused to either directly or indirectly by this equipment to any person. This includes the Purchaser and its employees as when as any agents or contractors of the Purchaser. As well there is no direct or indirect coverage of any claim for damage or loss of property/business which is caused or contributed to by the Equipment or any failure thereof, regardless of whether directly or indirectly caused by CBI Manufacturing or by any default or negligence of CBI Manufacturing and its personnel, agents or contractors.

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1.3 UNIT SPECIFICATIONS

1.3.1 TRIPLEX PLUNGER PUMP

The pump truck is integrated with an SJ300 Plunger Pump. The SJ300 is a single acting triplex pump and the specifications are included below.

- Stroke: 127 mm (5 in).
- Maximum Main shaft Speed: 360 RPM.
- Maximum Pinion Shaft Speed: 1555 RPM.
- Maximum Rod Load: 110,000 lbs.
- Rated Hydraulic Horsepower: 300 hp.
- Maximum Hydraulic Horsepower: 350 hp.
- Maximum Pressure: 37.9 MPa (5,500 psi).
- Maximum Flow: 10.6 bpm.
- Weight: 4,800 lbs.

NOTE: Refer to APPENDIX "E" for more information.

1.3.2 MANIFOLD

The manifold is a seven-valve 5000 psi assembly connected with assorted pipe, fittings and unions. The components installed are listed below.

- Seven 50 mm x 34.4 MPa (2" x 5000 psi) gate valve.
- One 76mm x 1.6 MPa (3" x 230 psi) wafer style butterfly valve w/ handle.
- One 50 mm x 34.4 MPa (2" x 5000 psi) relief valve
- One 50 mm x 34.4 MPa (2" x 5000 psi) swing check valve.
- One 50 mm x 41.3 MPa (2" x 6000 psi) Type D mud gauge.

NOTE: Refer to APPENDIX "D" for more information.

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1.3.3 BOWIE PUMP (Charge Pump)

The pump truck is equipped with a 300 Series Rotary Pump Model 4300 STDH.

- Max Speed: 400 RPM.
- Pressure: 827 kPa (120 psi).
- Flow: 1.25 m3/min (330 gal/min).

NOTE: Refer to APPENDIX "F" for more information.

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1.3.4 Hydraulic Motor

The pump truck is equipped with a Sauer/Danfoss #151F2202 hydraulic orbit motor, specifications are included below.

Motor type			OMS 125
Geometric displacement	(in^3)		7.67
Max. Speed	(rpm)	cont.	600
		int.[1)]	720
Max. Torque	(in-lbs)	cont.	2850
		int.[1)]	3300
		peak[2)]	3500
Max. output	(hp)	cont.	23
		int.[1)]	28
Max. pressure drop	(psi)	cont.	2500
		int.[1)]	3000
		peak[2)]	3300
Max. oil flow	(gpm, US)	cont.	20
		int.[1)]	24
Max. inlet pressure	(psi)	cont.	3000
		int.[1)]	3600
		peak[2)]	4400
Max. starting pressure with unloaded shaft	(psi)		150
Min. starting torque	(in-lbs)	at max. Press. Drop cont.	2300
		at max. Press. Drop int.[1)]	2700
Min. speed [4)]	(rpm)		8
Port Size			#10 SAE
Mount Flange			4-Bolt
Shaft			1.25”

1) Intermittent operation: the permissible values may occur for max. 10% of every minute.

2) Peak load: the permissible values may occur for max. 1% of every minute.

NOTE: Refer to APPENDIX “J” for more information.

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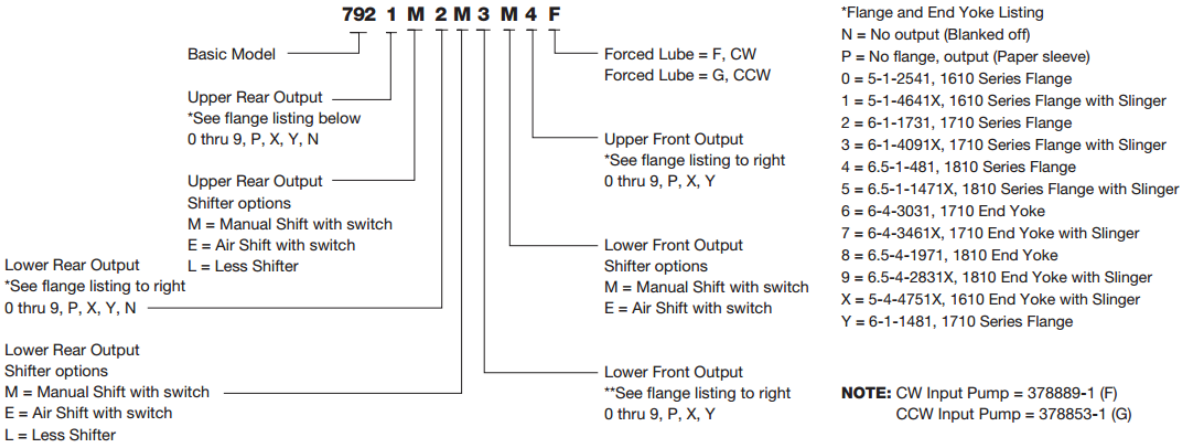
1.3.5 TRANSFERCASE

The Transfercase is the Spicer 792

Specifications:

792 Model Number Construction - Remote Mount


792 1 M 2 M 3 M 4 F
Basic Model
Upper Rear Output
*See flange listing below
0 thru 9, P, X, Y, N
Upper Rear Output
Shifter options
M = Manual Shift with switch
E = Air Shift with switch
L = Less Shifter
Lower Rear Output
*See flange listing to right
0 thru 9, P, X, Y, N
Lower Rear Output
Shifter options
M = Manual Shift with switch
E = Air Shift with switch
L = Less Shifter
Forced Lube = F, CW
Forced Lube = G, CCW
Upper Front Output
*See flange listing to right
0 thru 9, P, X, Y
Lower Front Output
Shifter options
M = Manual Shift with switch
E = Air Shift with switch
Lower Front Output
**See flange listing to right
0 thru 9, P, X, Y
*Flange and End Yoke Listing
N = No output (Blanked off)
P = No flange, output (Paper sleeve)
0 = 5-1-2541, 1610 Series Flange
1 = 5-1-4641X, 1610 Series Flange with Slinger
2 = 6-1-1731, 1710 Series Flange
3 = 6-1-4091X, 1710 Series Flange with Slinger
4 = 6.5-1-481, 1810 Series Flange
5 = 6.5-1-1471X, 1810 Series Flange with Slinger
6 = 6-4-3031, 1710 End Yoke
7 = 6-4-3461X, 1710 End Yoke with Slinger
8 = 6.5-4-1971, 1810 End Yoke
9 = 6.5-4-2831X, 1810 End Yoke with Slinger
X = 5-4-4751X, 1610 End Yoke with Slinger
Y = 6-1-1481, 1710 Series Flange
NOTE: CW Input Pump = 378889-1 (F)
CCW Input Pump = 378853-1 (G)

NOTE: Refer to APPENDIX "I" for more information.

OPTIONAL PTO:

FABCO PT0-170

Specifications:

* All ratings nominal. Actual capacities determined based upon review of application by FABCO Engineering.

NOTE: Refer to APPENDIX "H" for more information.

Ratings – Nominal *	
Output Torque – filter	10,000 Lb.-Ft.
Output Torque – Rear Axle	15,000 Lb.-Ft.
Input Horsepower	350 HP
Input Speed	2,600 RPM
Ratio	1:1
Gear Type Helical, Case Hardened	Gear Type Helical, Case Hardened
Shaft Sizes	
Input and Rear Axle Output	2.50 Inch, 10 Parallel Spline
Shaft Spacing (Drop)	16.25 Inch
Shift Mechanism	Integral Air Cylinders
Bearings	Tapered Roller
Housing	Cast Iron
Lubrication	Lubrication Pump & Spin on Filter
Lubricant	SAE 50 or SAE 90
Oil Capacity	6.50 Quarts
Weight – Dry	400 Lb

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1.3.6 HYDRAULIC SYSTEM

The hydraulic system is equipped with the following equipment:

- One Chelsea Hydraulics 859 Series Power Take-Off/ One Spicer 792
- A Two stage hydraulic pump assembly to operate the lube pump, winch and charge pump orbit motor.
- One 190 liter (50 gallon) hydraulic tank.
- Flow meter, refer to APPENDIX “K” for more information.
- Flow Sensor, Refer to APPENDIX “L” for more information.
- Kicker Air bags
- Pressure relief

NOTE: Refer to APPENDIX “B” for more information on the hydraulic schematics.

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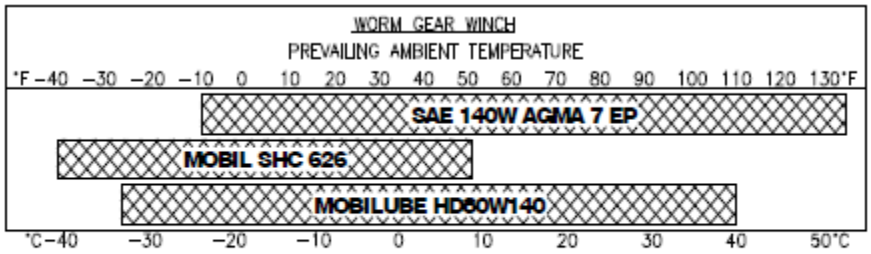
1.3.7 WINCH

The pump truck is equipped with a H34-SLRFODX Tulsa Winch. The specifications are as follows:

- Recommended rope ¾”x 75ft Safety Splice

	AMOUNT	OIL TYPE
GEARBOX SECTION	3.00 QTS	SEE CHART BELOW
BRAKE SECTION	TO LEVEL	LIGHTWEIGHT NON-EP*

*SAE 20W, AUTOMATIC TRANSMISSION FLUID, OR MOST HYDRAULIC OILS.


WORM GEAR WINCH
PREVAILING AMBIENT TEMPERATURE
°F −40 −30 −20 −10 0 10 20 30 40 50 60 70 80 90 100 110 120 130°F
SAE 140W AGMA 7 EP
MOBIL SHC 626
MOBILUBE HD80W140
°C −40 −30 −20 −10 0 10 20 30 40 50°C

All oils must meet MIL-PRF2105E standards. Substitution from a reputable manufacturer is allowed as long as type and grade are maintained.

NOTE: Refer to APPENDIX “G” for more information.

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1.3.8 BATTERY BOX

The battery box is mounted ahead of the fuel tank on the passenger side.

1.3.9 ELECTRICAL SYSTEM

A. Pumptruck

i. Double fluorescent lighting over the truck on top of the headache rack (Jackson Power RL 243)
ii. Double fluorescent lighting over the manifold on top of the hydraulic tank.

B. Mudtank

i. Jackson Power RL 483 is mounted on the side of the cabinet
   - 4 switches
   - 4 receptacles
   - 30 Amp — 120 V AC

1.3.10 TOOLBOX AND STORAGE

- Underbody toolbox is installed behind the fuel tank on the driver/passenger side of the truck.
- Cabinet is located under the control console.
- Pipe bin on the side of the mud tank.

1.3.11 MISCELLANEOUS ACCESSORIES

- Two sets of sliding chain racks were installed under the deck between the outriggers and the center kicker. One set installed on each side of the truck.
- One cord rack was mounted next to the control console.

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1.4 PHOTOGRAPHS

Figure 1.4.1 (Front Driver view) Pump

Figure 2 (Back Passenger view)

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1.5 GENERAL DIMENSIONS / WEIGHT

Please look at Appendix A for general dimensions for the Pumptruck.

Gross weight	22,835 kg (50,342.5 lbs)
Front Axle	6925 kg (15,267 lbs)
Rear Axle	15,910 kg (35,075.5 lbs)

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PART II: UNIT OPERATION

2.1 USE OF THIS INFORMATION

The operating procedure outlined in this manual is meant only as a guideline for truck operation. Because each application of this unit will be unique, it is left to the operator and or owner of the equipment to establish an operating procedure for this equipment. This procedure must adhere to American Petroleum Institute Standards (or equivalent) and applicable regulations in the region of operation.

The truck has been designed to function reliably in a wide range of conditions. By following an effective preventative maintenance program, having properly trained operators, and treating the equipment with respect will reduce unnecessary equipment wear.

The maintenance program as well as the fluids and lubricants should reflect the climate and operating conditions of the truck.

The manual is intended only for the equipment supplied by CBI Manufacturing.

2.2 SAFETY

Although this equipment has been designed to minimize personnel hazards, safe and proper operation of this truck is the responsibility of the Operating Company. The following set of safety precautions, along with the Operating Company's Safety Policies and Procedures, must first be read and understood by any and all personnel before they operate or perform maintenance on this unit.

2.2.1 SAFETY PRECAUTIONS

The operating conditions of each different job are unique and therefore must be assessed on an individual basis to minimize equipment damage and personnel hazards.

Before starting each job have a pre-job discussion to ensure that employees are aware of their individual responsibilities as well as the hazards of the particular job site. Have a briefing of the proper safety precautions and procedures that are to be followed.

This truck has a complex control system and only trained personnel should operate it.

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2.2.2 CONTROL LOCKOUTS

To prevent injury due to unintentional operation of the equipment, the controls are to be locked out during repair or maintenance procedures.

2.2.3 ELECTRICAL CONNECTIONS

Be certain to disconnect power to any electric cabling when it is being connected or disconnected.

2.2.4 PRESSURIZED FLUIDS

This truck has piping and hoses that contain pressurized fluids. Proper safety precautions are required when working around these components.

2.2.5 WARNING DEVICES

The vehicle's back-up alarm is the only warning device to alert personnel that the equipment is about to move. It is recommended that procedures be developed by the operator/owner for preventing the equipment from being engaged at an unsafe time.

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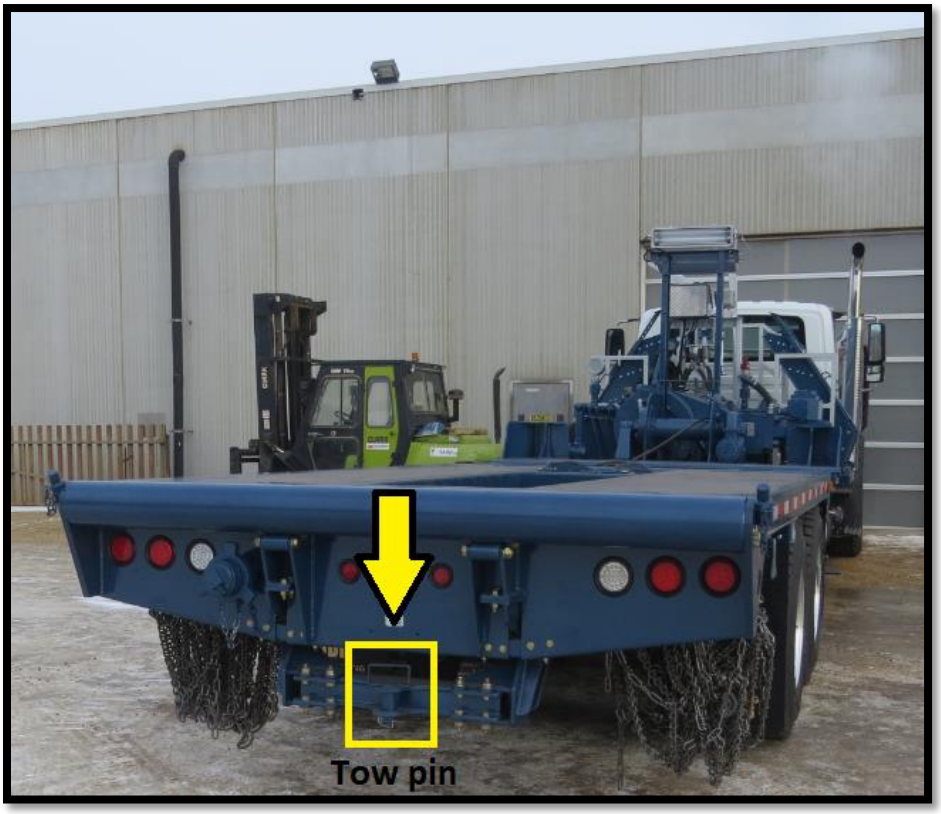
2.3 DRIVING THE UNIT

It is up to the owner and or operator of this unit to develop proper driving and operation procedures that conform to regional law, regulations, and conditions. In order to drive this truck, the operator should have all of the necessary training as well as an understanding of all of the mechanical aspects of the unit's operation.

Some general guidelines associated with driving this truck are:

- Because of the unit's long wheelbase, it has a wide turning radius and requires someone on the ground to guide the driver in confined areas.
- When the Mud Tank is being transported on the pumptruck, the pumptruck top is heavy. Extra CAUTION is needed in order to prevent roll over.
- When stuck, the unit should be pulled out rather than trying to drive out as the vehicle has sufficient power to damage its drive train in such a case. Rated tow points provided. Look at the following picture for towing points:



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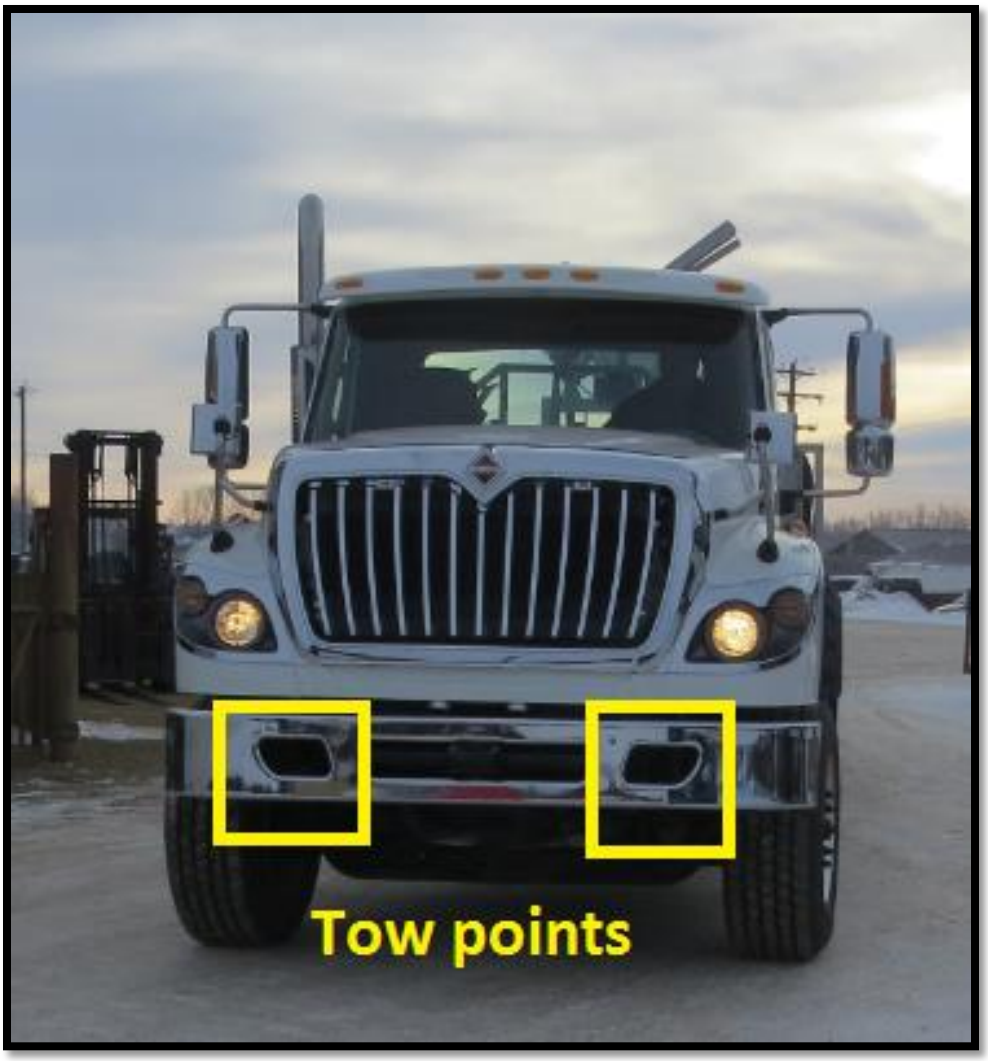

- When driving the unit, seatbelts must be worn at all times.
- Monitor the truck's gauges closely to ensure everything is running properly and to avoid mechanical failure. The vehicle is equipped with ABS brakes.

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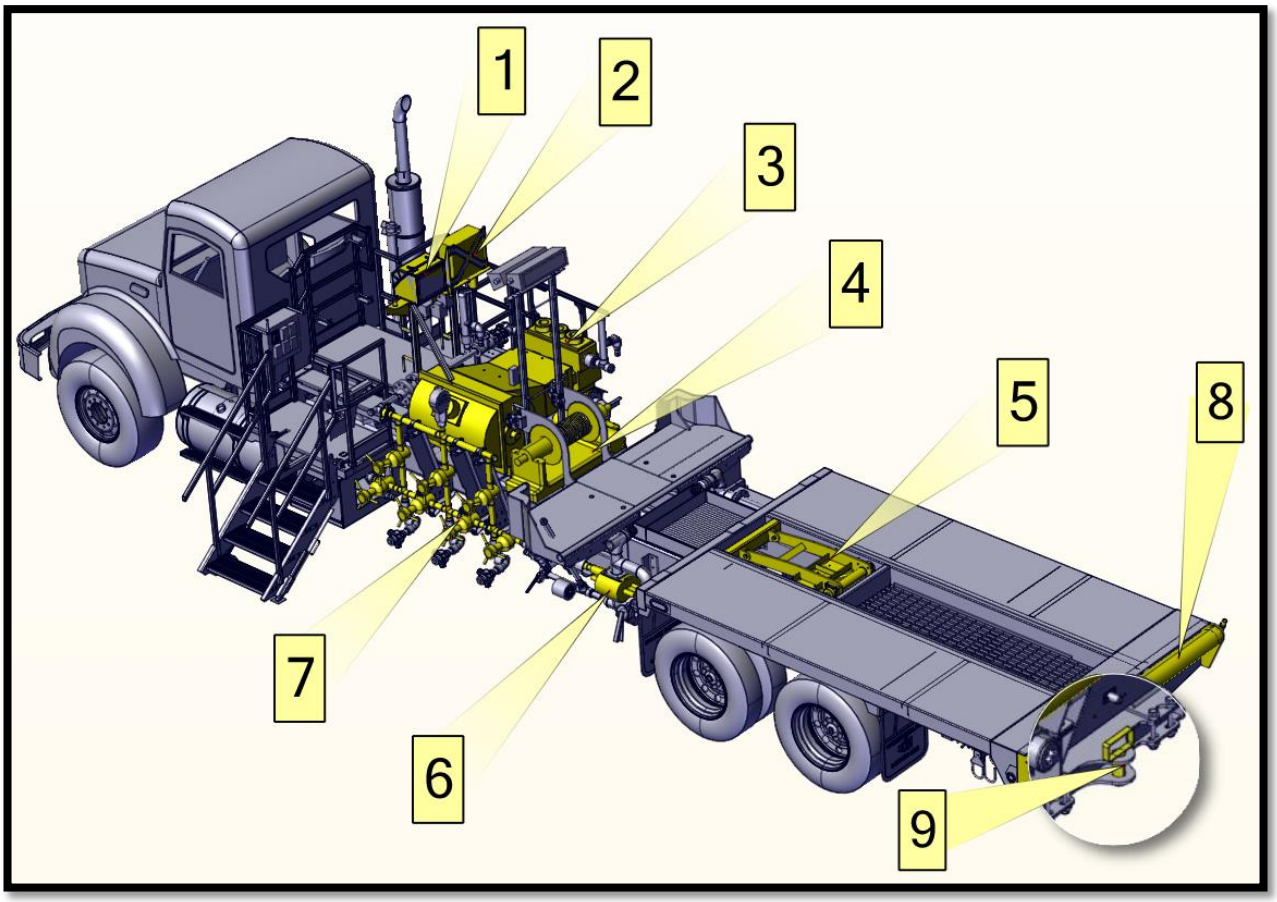
2.4 PUMP TRUCK MAJOR COMPONENTS



Pump Truck Major Components

1. Pump Truck Control Console.
2. Electrical Box
3. Triplex Plunger Pump.
4. Winch.
5. Center Kicker.
6. Charge Pump (Bowie Pump)
7. Manifold
8. Live Roller
9. Tow Pin

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2.5 PUMP TRUCK CONTROLS AND INSTRUMENTATION

2.5.1 CONTROL CONSOLE

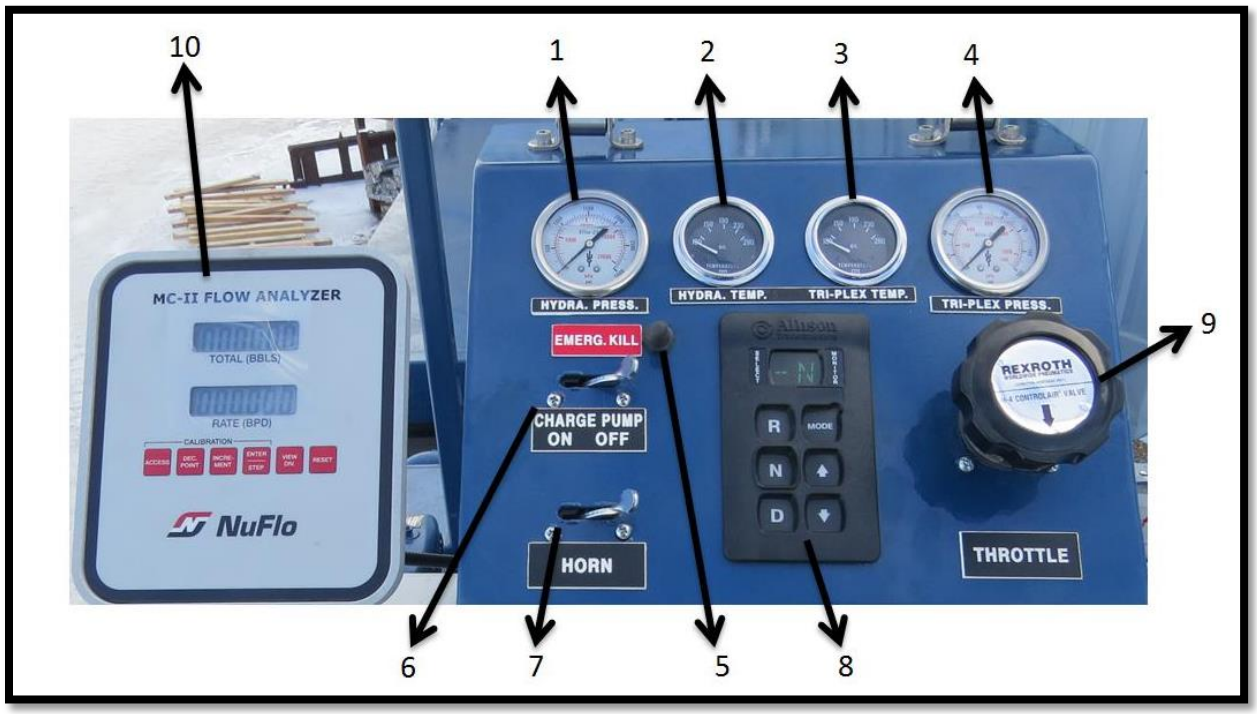

Figure 2.5.1 (Control console) Pump Truck

Pump Truck Control Console

1. Hydraulic Pressure Gauge.
2. Hydraulic Temperature Gauge.
3. Triplex Temperature Gauge.
4. Triplex Pressure Gauge.
5. Emergency Kill.
6. Charge Pump Switch.
7. Horn
8. Transmission Control.
9. Throttle.
10. Flow Analyzer Console.

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Thanks for having a look at the SNEAK PEAK of our Pump Truck Manual! The complete 61 page manual is available after purchasing a unit and includes schematics and much more information.

Don't See Exactly What You Are After?

All our products have full engineering support so if you don't see the exact specifications you are after, we will design to meet your needs. We utilize the 3D CAD software SolidWorks to model up our equipment before production. We also have full finite element analysis capabilities to quickly and efficiently analyze and optimize design changes.

Let Us Design Your Next Pump Truck or Rig!

Jason is a partner and VP of Operations at Sparta Engineering (located in Linden, AB) and has been designing and managing the manufacturing of various oil field equipment ranging from period one double service rigs down to hole tools since 2005. Jason has a particular passion for optimizing design for manufacturing. He also specializes in various crane related activities including subframe design, crane deck design, load and stability testing and acting stamp engineer for Global Crane Inspection.

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